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Claim Amendments

What is claimed is:

- 1 1. (Original) A method for characterizing a drilling hazard in a proposed wellbore,  
2 comprising:  
3 determining a well plan including at least a wellbore trajectory;  
4 estimating a likelihood of occurrence of, a position along the trajectory and a severity of  
5 consequences of at least one drilling hazard; and  
6 displaying on a representation of at least a portion of the wellbore trajectory, at least one  
7 of the position of, the likelihood and the severity of the at least one drilling hazard.  
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- 1 2. (Presently amended, Once) The method as defined in claim 1 wherein the estimating the  
2 position, likelihood and severity is performed by determining a Bayesian uncertainty  
3 thereof based on a correlation of the well plan to an earth model of earth formations along  
4 the wellbore trajectory.  
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- 1 3. (Original) The method as defined in claim 2 wherein the earth model is generated from at  
2 least one of offset wellbore data, seismic survey data and correlative wellbore data from  
3 similar earth formations distal from a location of the proposed wellbore.  
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- 1 4. (Original) The method as defined in claim 1 further comprising:  
2 adjusting at least one well plan parameter;  
3 recalculating at least one of the position, the likelihood and the severity of the at least one  
4 drilling hazard; and  
5 repeating the displaying.  
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- 1 5. (Original) The method as defined in claim 4 further comprising:  
2 repeating the adjusting and recalculating until at least one of a most likely cost to drill a  
3 wellbore, an estimated amount of lost time and a likelihood of encountering the at least one  
4 drilling hazard is minimized.  
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1 6. (Original) The method as defined in claim 4 wherein the at least one well plan parameter  
2 comprises one of casing depth, dog leg severity, and mud weight.

1 7. (Original) The method as defined in claim 4 wherein the at least one well plan parameter  
2 includes at least one drilling operating parameter.

1 8. (Original) The method as defined in claim 7 wherein the at least one drilling operating  
2 parameter comprises at least one of weight on bit and rotary speed.

1 9. (Original) The method as defined in claim 1 wherein the at least one drilling hazard  
2 comprises at least one of stuck pipe, lost circulation, taking a kick and BH(Original) A  
3 component failure.

1 10. (Original) The method as defined in claim 1 wherein the displaying comprises presenting  
2 a graphic cylinder on the representation at the position, a diameter of the cylinder related to the  
3 likelihood, a length of the cylinder related to the severity and a color of the cylinder related to a  
4 type of the at least one drilling hazard.

1 11. (Original) The method as defined in claim 1 wherein the displaying comprises presenting  
2 with respect to depth in the wellbore at least one of a color coded and shade coded indicator, the  
3 indicator corresponding to one of the likelihood of and the severity of the drilling hazard.

1 12. (Original) The method as defined in claim 11 further comprising a reference indicator  
2 disposed proximate to the at least one of the color coded and shade coded indicators, the  
3 reference indicator tied to a textual description of at least the type of drilling hazard.

1 13. (Original) A method for optimizing a well plan for a proposed wellbore, comprising:  
2 selecting an initial well plan comprising at least a wellbore trajectory;  
3 determining for the initial well plan a position along the trajectory, a likelihood of  
4 occurrence, and a severity of consequence of encountering at least one drilling hazard;

5 adjusting at least one parameter of the initial well plan;  
6 redetermining the position, likelihood and severity of the at least one drilling hazard; and  
7 repeating the adjusting and redetermining until at least one of a most likely cost to drill a  
8 wellbore, an amount of lost time and a likelihood of encountering the at least one drilling hazard  
9 is minimized.

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1 14. (Presently amended, Once) The method as defined in claim 13 wherein the determining  
2 and the redetermining the position, likelihood and severity are performed by determining  
3 a Bayesian uncertainty thereof based on a correlation of the well plan on an earth model  
4 of earth formations along the wellbore trajectory.

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1 15. (Original) The method as defined in claim 14 wherein the earth model is generated from  
2 at least one of offset wellbore data, seismic survey data and correlative wellbore data  
3 from similar earth formations distal from a location of the proposed wellbore.

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1 16. (Original) The method as defined in claim 13 wherein the at least one well plan  
2 parameter comprises one of casing depth, dog leg severity, and mud weight.

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1 17. (Original) The method as defined in claim 15 wherein the at least one well plan  
2 parameter includes at least one drilling operating parameter.

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1 18. (Original) The method as defined in claim 15 wherein the at least one drilling operating  
2 parameter comprises at least one of weight on bit and rotary speed.

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1 19. (Original) The method as defined in claim 1 wherein the at least one drilling hazard  
2 comprises at least one of stuck pipe, lost circulation, taking a kick and BH(Original) A failure.

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1 20. (Original) The method as defined in claim 13 further comprising displaying in graphic  
2 form at least one of the position, likelihood and severity of the at least one drilling hazard for  
3 evaluation by a system operator.

1 21. (Original) The method as defined in claim 20 wherein the displaying comprises  
2 presenting a graphic cylinder on the representation at the position, a diameter of the cylinder  
3 related to the likelihood, a length of the cylinder related to the severity and a color of the cylinder  
4 related to a type of the at least one drilling hazard.

1 22. (Original) The method as defined in claim 20 wherein the displaying comprises  
2 presenting with respect to depth in the wellbore at least one of a color coded and shade coded  
3 indicator.

1 23. (Original) A method for drilling a well, comprising  
2 selecting an initial well plan comprising at least a wellbore trajectory;  
3 starting drilling the well according to the initial well plan;  
4 measuring at least one of a drilling operating parameter and an earth formation  
5 characteristic during the drilling;  
6 determining at least one of a position along the trajectory, a likelihood of encountering  
7 and a severity of occurrence of at least one drilling hazard in response to the measuring;  
8 adjusting at least one parameter of the initial well plan for an unfinished portion of the  
9 well;  
10 redetermining the position, likelihood and severity of the at least one drilling hazard;  
11 repeating the adjusting and redetermining until for the unfinished portion of the well at  
12 least one of a most likely cost to drill, an amount of lost time and a likelihood of encountering  
13 the at least one drilling hazard is minimized; and  
14 drilling the unfinished portion of the well according to the adjusted well plan.

1 24. (Presently amended, Once) The method as defined in claim 23 wherein the determining  
2 and redetermining the position, likelihood and severity are performed by determining a  
3 Bayesian uncertainty thereof based on a correlation of the initial well plan to an earth  
4 model of earth formations along the wellbore trajectory.

1 25. (Original) The method as defined in claim 24 wherein the earth model is generated from  
2 at least one of offset wellbore data, seismic survey data and correlative wellbore data  
3 from similar earth formations distal from a location of the proposed wellbore.

1 26. (Original) The method as defined in claim 25 wherein the earth model is redetermined  
2 using data from the measuring, and the Bayesian uncertainty is determined by correlating the  
3 adjusted initial well plan to the redetermined earth model.

1 27. (Original) The method as defined in claim 23 wherein the at least one well plan  
2 parameter comprises one of casing depth, dog leg severity, and mud weight.

1 28. (Original) The method as defined in claim 23 wherein the at least one well plan  
2 parameter includes at least one drilling operating parameter.

1 29. (Original) The method as defined in claim 28 wherein the at least one drilling operating  
2 parameter comprises at least one of weight on bit and rotary speed.

1 30. (Original) The method as defined in claim 23 wherein the at least one drilling hazard  
2 comprises at least one of stuck pipe, lost circulation, taking a kick and BH(A) failure.

1 31. (Original) The method as defined in claim 23 further comprising displaying in graphic  
2 form the position, likelihood and severity of the at least one drilling hazard for evaluation by a  
3 system operator.

1 32. (Original) The method as defined in claim 31 wherein the displaying comprises  
2 presenting a graphic cylinder on the representation at the position, a diameter of the cylinder  
3 related to the likelihood, a length of the cylinder related to the severity and a color of the cylinder  
4 related to a type of the at least one drilling hazard.

- 1 33. (Original) The method as defined in claim 31 wherein the displaying comprises
- 2 presenting with respect to depth in the wellbore at least one of a color coded and shade coded
- 3 indicator.

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